NASA TECHNICAL MEMORANDUM

NASA TM-76120

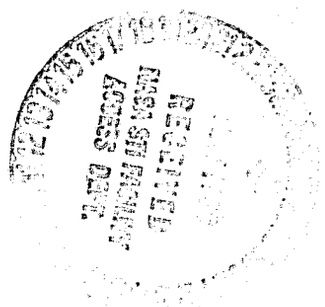
PROCEDURE OF PRACTICAL EXERCISE WITH STUDENTS ON THE THEME "PATHOGENIC EFFECT OF ACCELERATIONS ON THE ORGANISM"

I. M. Tyrtyshnikov and L. M. Tarasenko

Translation of "K Metodike prakticheskogo zanyatiya so studentami po teme "patogennoye deystviye uskoreniy na organizm", Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya, No. 4 (July-August), 1978 pp 81-82

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D. C. 20546

APRIL 1980



STANDARD TITLE PAGE

1. Report No. NASA TM-76120	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle PROCEDURE OF PRACTICAL EXERCISE WITH STUDENTS ON THE THEME "PATHOGENIC EFFECT OF ACCELERATIONS ON THE ORGANISM"		5. Report Date APRIL 1980 6. Performing Organization Code
7. Author(s) I. M. Tyrtyshnikov and L. M. Tarasenko		8. Performing Organization Report No. 10. Work Unit No.
9. Performing Organization Name and Address SCITRAN Box 5456 Santa Barbara, CA 93108		11. Contract or Grant No. NASw-3198 13. Type of Report and Period Covered Translation
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, D.C. 20546		14. Sponsoring Agency Code

15. Supplementary Notes

Translation of "K Metodike prakticheskogo zanyatiya so studentami po teme "patogennoye deystviye uskoreniy na organizm", Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya, No. 4 (July-August), 1978 pp 81-82

16. Abstract

Effects of acceleration alone and coupled with administration of either aminazine (chlorpromazine--a sedative) or caffeine (a stimulant) on the development of kinetoses in mice are studied. The problem is presented as a method to teach students, explaining the effects of motion sickness and sedative or stimulant drugs, and to demonstrate the role of the nervous factor in the development of kinetosis.

17. Key Words (Selected by Author(s))

18. Distribution Statement

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	5	

UDC 616.092.612.014.47:531.113]:378.661

PROCEDURE OF PRACTICAL EXERCISE WITH STUDENTS ON THE THEME "PATHOGENIC EFFECT OF ACCELERATIONS ON THE ORGANISM"

By

I. M. Tyrtyshnkov and L. M. Tarasenko*

In practical exercises with students on the theme "Pathogenic Effect of Accelerations on the Organism" as an illustration the experiment with reproduction in mice of kinetoses was cited [1]. According to published data, accelerations alter the functional state of the nervous system not only due to the disruption of afferent pulsation, but also as a consequence of the direct effect of inertial forces on the brain [2,3,4]. /81**

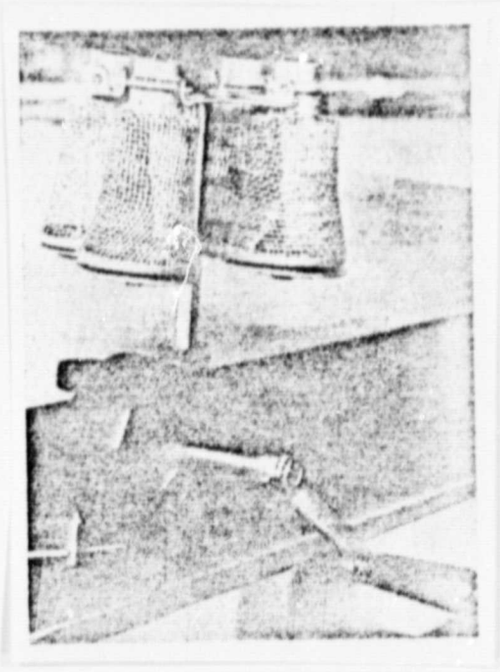
EFFECT OF FUNCTIONAL STATE OF CENTRAL NERVOUS SYSTEM ON DEVELOPMENT OF KINETOSES IN MICE

Nature of effect	Time of effect, s	Clinical manifestations
Radial acceleration	25	Ataxia, dyspnea, exophthalmos
Radial acceleration	60	"Circus movements," dyspnea, hemorrhage in eyeballs, slower restoration of disrupted functions, death of individual animals
Caffeine + radial acceleration	60	"Circus movements," dyspnea, death of considerable number of experimental animals
Aminazine + radial acceleration	60	Depressed state, slight dyspnea

In the proposed experiment in the beginning the mice were exposed to the action of radial acceleration for 25 s and the pronounced nature of the phenomena

*Department of Pathological Physiology of the Poltava Medical Stomatological Institute.

**Numbers in margin indicate pagination in original foreign text.



Instrument with Wire-Mesh Enclosures for Reproducing Kinetoses in Mice

characteristic for kinetoses are considered: "circus movements," ataxia, dyspnea, exophthalmos, as well as the rate of restoration of the disrupted functions. Then the duration of the effect of accelerations was increased. The students were convinced that the severity of the kinetoses increased here.

In order to study the role of the nervous factor in the mechanism of kinetosis development some mice were given a subcutaneous dose of a 0.25% solution of aminazine (1.0 ml per 100 g, others--10% solution of caffeine (1.0 ml per 100 g). At the end of 10-15 min, the mice simultaneously with the intact were exposed to the effect of radial acceleration for 60 s. The degree of disruption in the functions of the experimental mice was not the same (see table). On the background of caffeine pathological phenomena were pronounced especially clearly, often a fatal outcome occurred in the mice. A less pronounced degree of disruption in the functions and their earlier restoration were observed in animals with preliminary administration of aminazine. The experiments with preliminary administration of substances that /82
alter the functional state of the central nervous system convinced the students of the important role of the nervous factor in the mechanism of development of kinetoses.

To set up the experiment it is expedient to use wire-mesh enclosures (see figure) instead of cellophane bags with ties. This excludes the effect of cessation of air access and permits observation of their condition even before removal of the animals from the enclosures.

Calculation of the magnitude of the employed acceleration was made according to the formula suggested by P. D. Gorizontov and N. N. Sirotinin [3]: $a=R.(P.n)^2$, where a--acceleration, R--radius of rotation (in m); P--coefficient equal to

3.14; n--number of revolutions per second.

We consider it possible to recommend this demonstrative experiment with the use of mesh enclosures for mice for the practical exercises with students.

References

1. Uchebno-metodicheskoye rukovodstvo k prakticheskim zanyatiyam po patologicheskoy fiziologii ["Educational-Method Manual for Practical Exercises on Pathological Physiology"], ed. L. M. Ishimova, Moscow, 1971.

2. Parin, V.V.; Kosmolinskiy, F. P.; and Dushkov, B. A. Kosmicheskaya biologiya i meditsina ["Space Biology and Medicine"], Moscow, 1970.

3. Patologicheskaya fiziologiya ekstremal'nykh sostoyaniy ["Pathological Physiology of Extreme States"], ed. P. D. Gorizontov, and N. N. Sirotinin, Moscow, 1973.

4. Dostizheniya kosmicheskoy biologii i meditsiny ["Advances in Space Biology and Medicine"], Vol. 2, Book 2, Moscow, 1975.